

## **REMARKS**

### ***Claim Amendments***

Claims 1, 4-13, 15-22, 24-25, and 27-28 are pending in this application. Claims 2, 3, and 14 are canceled. Claims 1, 4-5, 13, and 15-16 are amended. Claims 26 and 27 are newly presented. Support for the amendments can be found throughout the specification and the original claims as filed. *See, e.g.*, paragraph [0036], [0069]-[0072], [0077], and Tables 1-4.<sup>1</sup> No new matter has been added.

### ***Specification***

The Office Action objects to the specification's use of hyperlinks and/or other forms of browser-executable code. Applicant has amended the specification remove these hyperlinks and other forms of browser-executable code. These amendments replace the amendments made in the preliminary amendment filed March 30, 2006.

In view of the foregoing, Applicant respectfully requests withdrawal of the objection to the specification.

### ***Drawings***

The specification has been amended to provide a description of Tables 1-4, as per the Examiner's suggestion.<sup>2</sup> The Table heading in paragraph [0167] has also been amended to recite "Table A."

In view of the foregoing, Applicant respectfully requests withdrawal of the objection to the specification.

### ***Rejections Under 35 U.S.C. §112, First Paragraph***

Claims 1-22 and 24-25 stand rejected under 35 U.S.C. §112, first paragraph, because, according to the Examiner, the specification, while being enabling for a genetically modified plant

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<sup>1</sup> The paragraph numbers cited herein refer to the paragraph numbers set forth in the copy of the specification, which was filed on March 30, 2006, and is attached herewith as **Exhibit A**. Applicant's preliminary amendment, filed on the same day, also refers to these paragraph numbers.

<sup>2</sup> Applicant notes that the paragraph numbers cited in the Office Action appear to correlate with US 2007/0011777, the publication of the instant application. However, for the sake of consistency, Applicant's amendments correlate with the specification attached herewith as Exhibit A. Applicant also points out that several of the amendments reflected herein were previously set forth in Applicant's preliminary amendment filed on March 30, 2006.

cell comprising SEQ ID NO: 3 or nucleic acid encoding SEQ ID NO: 4, does not reasonably provide enablement for any modified plant cell with an increase in activity of any Class 3 branching enzyme, wherein the modification is a nucleic acid sequence with at least 50% identity to SEQ ID NOs: 3 or 4, or any nucleic acid that hybridizes to SEQ ID NO: 3 under unspecified stringent conditions. *See* Office Action, page 3.

Applicant respectfully traverses this rejection.

**A. The Claims Require Specific Nucleic Acids Coding Specific Class 3 Branching Enzymes**

Independent claims 1 and 13 have been amended to require that the plant cell is modified by introducing a foreign nucleic acid molecule which codes a class 3 branching enzyme, wherein the class 3 branching enzyme has an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128), which are separated from one another by at least 100 amino acids. Furthermore, claims 4 and 15 have been amended to recite “80%” identity and specific hybridization conditions. Accordingly, the claims are directed to plant cells, plants, and methods of making plants modified with specific nucleic acids coding specific class 3 branching enzymes.

**B. The Class 3 Branching Enzymes Are Defined**

The Office Action contends that the specification does not detail any domains or activity that would enable one of skill in the art to recognize embodiments that are encompassed by the instant claims. *See* Office Action, page 4.

Applicant respectfully disagrees. As discussed above, the class 3 branching enzymes have an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128), which are separated from one another by at least 100 amino acids. This structural definition is disclosed and explained in the specification. *See, e.g.*, Specification, paragraphs [0034]-[0040]. The iso-amylase and alpha-amylase domains are defined by allocation to sequence domains Pfam02922 and Pfam00128 of the Pfam Database. *See Annexes 1 and 2*, attached herewith. The Pfam database is disclosed and explained in the specification. *See* Specification, paragraphs [0037]-[0040] and Tables 1-4; *see also* <http://pfam.sanger.ac.uk/>.

One of skill in the art would understand that a given nucleic acid sequence can be translated into the corresponding amino acid sequence and the amino acid sequence can be imported into the Pfam database to check the domains. For example, the Pfam motive of SEQ ID NO: 4 is provided in Annex 3. The first table on page 2 of Annex 3 shows that the iso-amylase domain ends at

position 212 and the alpha-amylase domain starts at position 414. Thus, both domains are separated from one another by more than 100 amino acids. Accordingly, Applicant submits that one of skill in the art can compare any branching enzyme with the domain structures of the public Pfam database to classify whether the enzyme is a class 3 branching enzyme.

**C. The Claims Recite Specific Hybridization Conditions**

The Office Action objects to the recitation of “stringent conditions.” *See* Office Action, page 4.

Applicant has amended claims 4 and 15 to recite specific hybridization conditions. Applicant submits that one of skill in the art can make and use nucleic acids that hybridize under these conditions.

**D. Starch Phenotypes**

The Office Action asserts that “it would be undue experimentation to evaluate all genetic variations of all genes affecting the level of already established starch branching enzymes, let alone the newly defined class 3 branching enzymes...” Office Action, page 6.

Applicant submits that the claims are not directed to such an evaluation. Rather, the claims relate to the introduction of at least one foreign nucleic acid molecule into the genome of the plant, wherein the foreign nucleic acid molecule codes a class 3 branching enzyme comprising specific domains. Applicant also points out that the specification teaches: (1) methods of demonstrating the activity of a class 3 branching enzyme; (2) methods for analyzing starch; (3) nucleic acid and amino acid sequences of a class 3 branching enzyme; and (4) a working example of genetically modified rice plant with increased expression of a class 3 branching enzyme. *See* Specification, paragraphs [0145]-[0171], Examples 1-3, and the sequence listing.

In view of the foregoing, Applicant respectfully requests withdrawal of the enablement rejection.

Claims 1-22 and 24-25 stand rejected under 35 U.S.C. §112, first paragraph as allegedly failing to comply with the written description requirement.

Applicant respectfully traverses this rejection.

The stated grounds for this rejection are similar to that of the enablement rejection. Thus, for the same reasons discussed above, Applicant submits that the claims are adequately described.

In particular, Applicant point outs that the claims relate to specific nucleic acid molecules encoding class 3 branching enzymes that are structurally defined and described in the specification.

As a final matter, on page 9 of the Office Action, the Examiner states “[w]ithout a description of which amino acids are required, there is also a lack of description as to which amino acids would need to be modified to *reduce* the activity of the class 3 branching enzyme.” (emphasis added).

Applicant respectfully submits that an object of the invention is not to reduce class 3 branching enzyme activity by changing/removing amino acids. Rather, the invention relates to increasing class 3 branching enzyme activity by introducing a foreign nucleic acid molecule which codes a class 3 branching enzyme into the genome of the plant.

In view of the foregoing, Applicant respectfully requests withdrawal of the written description rejection.

#### ***Rejections Under 35 U.S.C. §102***

Claims 1-17 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by EP 1103617 (“the ‘617 publication”) A2.

Applicant respectfully traverses this rejection.

Independent claims 1 and 13 have been amended to require that the plant cell is modified by a foreign nucleic acid molecule which codes a class 3 branching enzyme, wherein the class 3 branching enzyme has an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128), which are separated from one another by at least 100 amino acids.

The ‘617 publication does not teach such modified plant cells. The ‘617 publication discloses a sequence that was deposited as Accession No. A22363, attached herewith as **Annex 4**. The coding section of this sequence (i.e., starting at nucleotide no. 62 and ending at nucleotide no. 1702) was translated into the corresponding amino acid sequence and a search on domains was performed in the Pfam database.

The results of the Pfam search is attached herewith as **Annex 5**. The results show that the branching enzyme of the sequence contains an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128). The first table on page 2 of Annex 5 reveals that in the amino acid sequence of the ‘617 publication, the iso-amylase domain ends at position 160 and the alpha-amylase domain starts at position 201. Thus, both domains are separated by only 40 amino

acids—not by at least 100 amino acids as required by the claims. Accordingly, the ‘617 publication does not teach each and every claim element.

In view of the foregoing, Applicant respectfully requests withdrawal of the anticipation rejection.

### ***Rejections Under 35 U.S.C. §103***

Claims 1-22 and 24-25 stand rejected under 35 U.S.C. §103(a) as allegedly being obvious over the ‘617 publication, as applied to claims 1-17 above, and further in view of U.S. Patent No. 6,825,342 (“the ‘342 patent”).

Applicant respectfully traverses this rejection.

As discussed above, the ‘617 publication does not teach each and every claim element.

The ‘342 patent does not remedy the deficiencies of the ‘617 publication. Indeed, ‘342 patent does not teach or suggest a plant cell modified by a foreign nucleic acid molecule which codes a class 3 branching enzyme, wherein the class 3 branching enzyme has an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128), which are separated from one another by at least 100 amino acids. Accordingly, because the references, either alone or in combination, do not teach each and every claim element, Applicant respectfully requests withdrawal of the obviousness rejection.

**CONCLUSION**

It is believed that these amendments and remarks should place this application in condition for allowance. A notice to that effect is respectfully solicited. If the Examiner has any questions relating to this response or the application in general he is respectfully requested to contact the undersigned so that prosecution of this application may be expedited.

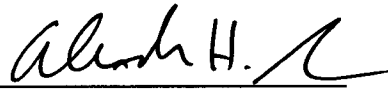
This response is being filed within the three-month time period set forth in the Office Action. Accordingly, no fees are due. However, should the USPTO determine that any fees are due in connection with this response, the Commissioner is hereby authorized to charge such fees to the undersigned's Deposit Account **No. 50-0206**.

Respectfully submitted,

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Date: September 10, 2008

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